

In-Depth Teaching on European Union Matters for Future Professionals Related to Industry 3.0 and Industry 4.0

Leonid MELNYK¹, Iryna DEHTYAROVA²,
Oleksandr KUBATKO³

Abstract

Future professionals in fields, which are in increasing demand on the labour market, need “Learning in Depth”. Such approach ensures that every student becomes familiar with specific EU issues they may choose to specialize on. It can be achieved via employing different teaching methodologies and technics. Developing in-depths learning materials, including hand-outs, power point presentations, tutorials materials, video-lectures, open on-line courses are part of this approach. Instead of traditional face-to-face lecturing, it implements lectures with open discussions and game simulations, targeting in particular cross-cultural peculiarities for sustainable development fostering based on achievements of Industry 3.0 and Industry 4.0. Much of the attention would be paid for the debates as a part of learning by doing methodology. The basic here is the Karl Popper format of debates. Its extended format with Government and Opposition as two confronting parties is preferable, modelled by debates with NGOs participation, local government, business, developers, and active citizens. The other type of team-work projects are round tables discussions, during which global scale issues will be simulated, where each student would need to become an expert for solving critical issues. There would be specific tasks of modelling production/consumption nets, including those achieved by social and solidarity economies.

Key words: in-depth teaching, in-depths learning, Karl Popper debates, social and solidarity economies, Industry 3.0, Industry 4.0

JEL: A23, O31, Q56

Future professionals in fields, which are in increasing demand on the labour market, need “Learning in Depth”. Such approach ensures that every student becomes familiar with specific EU issues they may choose to specialize on. It can be achieved via employing different teaching methodologies and technics.

¹ Leonid Melnyk, Dr., Professor, Sumy State University, e-mail: melnyksumy@gmail.com

² Iryna Dehtyarova, PhD, Associate Professor, Sumy State University, e-mail: irina_dehtyarova@econ.sumdu.edu.ua

³ Oleksandr Kubatko, PhD, Associate Professor, Sumy State University, e-mail: okubatko@econ.sumdu.edu.ua

What are these specific EU issues? Mostly they refer to sustainable development formation in conditions of Industry 3.0 and Industry 4.0. Developing in-depths learning materials, including handouts, power point presentations, tutorials materials, video-lectures, open on-line courses are part of this approach. It would allow future professionals to become real experts in modeling production/consumption nets, including those achieved by social and solidarity economies.

Originally ‘Learning in Depth (LiD) is a simple though radical innovation in curriculum and instruction, designed to ensure that all students become experts in something during their school years’ (WISE, 2017). If we attribute this method to university students we would develop in-depths learning materials, including handouts, power point presentations, tutorials materials, video-lectures, open on-line courses are part of this approach. Instead of traditional face-to-face lecturing, it implements lectures with open discussions and game simulations, targeting in particular cross-cultural peculiarities for sustainable development fostering based on achievements of Industry 3.0 and Industry 4.0 as a result of the Third and Fourth Industrial Revolutions.

Our ‘Learning in Depth’ approaches would ensure that every student becomes familiar with a particular EU related issue they may choose to specialize on. We would achieve this via employing different teaching methodologies and technics. The courses related to sustainable development, solidarity economy, etc. may start from developing in-depths learning materials, including handouts, power point presentations, tutorials materials (including game simulations), video-lectures, open on-line courses. Specifically, instead of traditional face-to-face lecturing, we would implement lectures connected with open discussions and game simulations, targeting in particular cross-cultural peculiarities for sustainable development fostering based on achievements of Third and Fourth Industrial Revolutions. We already have collected a large bank of data and materials gathered within EU on high levels of international standards and managing cross-cultural peculiarities of relevant social, economic, and ecological issues. Therefore, EU being one of the leading centres for promotion of Sustainable Development would serve as a good example for seeding and promoting ideas of sustainable development in Ukraine.

The Karl Popper Debate is one more approach to teaching students. International debate education association explains The Karl Popper Debate format in the following way: focuses on relevant and often deeply divisive propositions, emphasizing the development of critical thinking skills, and tolerance for differing viewpoints. To facilitate these goals, debaters work together in teams of three, and must research both sides of each issue. Each team is given the opportunity to offer arguments and direct questions to the opposing team. Judges then offer constructive feedback, commenting on logical flaws, insufficient evidence, or arguments that debaters may have overlooked.

Karl Popper debate should:

- focus on the core elements of controversial issues;
- emphasize tolerance for multiple points of view;
- emphasize the development of analytical thinking skills;

- provide students with the opportunity to debate many kinds of resolutions (International, 2004).

Its extended format with Government and Opposition as two confronting parties is preferable, modeled by debates with NGOs participation, local government, business, developers, and active citizens.

Each student is given a particular topic to learn about through a particular university course. The scope of topics will refer to basic concepts and principles of Industry 3.0 and Industry 4.0 as the main results of The Third and Fourth Industrial Revolutions, which bring the necessity of socio-cultural, socio-economic and technological transformations for sustainable development on local level.

For future professionals up to date learning materials are important. These refer to qualitative transformations of the economic system, the components of the triad of system-forming groups of factors (material, energy, information and synergetic) should correspond with the goals and objectives of such transformations.

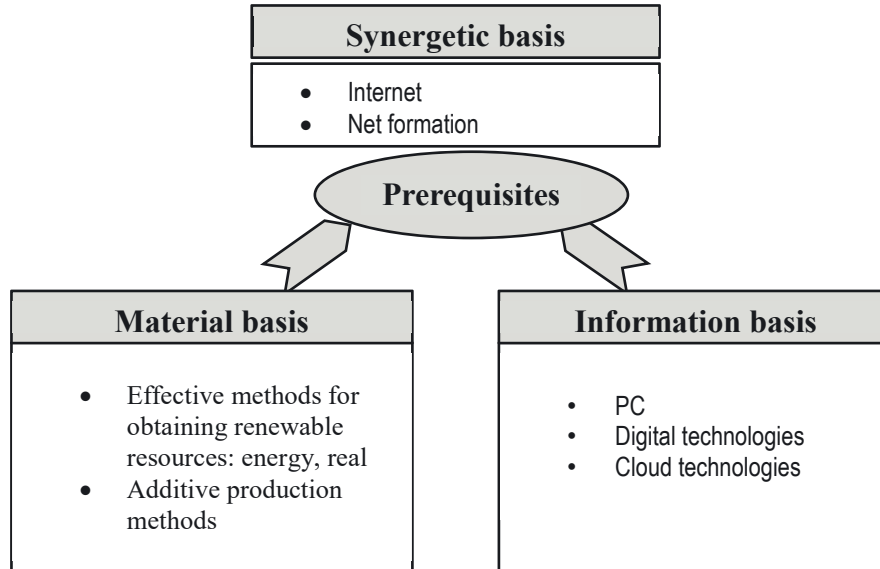
Any system is formed in the interaction of three basic groups of factors: material, information and synergetic. Their functions can be expressed in the following way: *material* – drive; *information* – direct (form the information algorithm of development); *synergetic* – unite (ensure consistent behavior of individual subsystems).

Currently, synergetic factors play the leading role in this process. Their main task is to integrate separate components of local economic systems into a single systemic whole – the global economy of the Earth ‘space ship’. This is exactly what happens in nature, where individual local ecosystems unite form a single biosphere of the planet.

One of the most important tasks of transforming the material and energy basis of the economy during the Third Industrial Revolution is its harmonization with the natural environment. This implies, first of all, the dematerialization of the production and consumption systems, in other words, their considerable ‘relief’, i.e. a decrease in the material consumption and energy intensity per unit of output (work performed) and for one person living on the earth, whose vital activity must be provided with everything necessary. In addition, the task of ecological harmonization of the material and energy basis necessitates the transition to organically compatible with ecosystem metabolism substances and closed cycles of resource use.

Figure 1 shows the necessary basic prerequisites for the implementation of the Third Industrial Revolution. Firstly, they assume the availability of effective (i.e., cheap enough for a unit of performed work) technical means (in particular, installations of alternative energy and 3D printers); secondly, the provision of a single (‘digital’) basis for fixing and transmitting information (for communication between people, a man with a machine and a machine with a machine), as well as the formation of a global memory system and a kind of an all-planet ‘think tank’ based on cloud technologies; thirdly, the formation of a unified communication basis on the basis of the Internet and network systems.

Figure 1. Basic prerequisites for implementation of the Third Industrial Revolution and start of the Fourth Industrial Revolution



Source: own contribution.

The formation of these prerequisites created a real basis for the solution of a number of practical tasks of the sustainable transformation of the economy in conditions of the Third Industrial Revolution.

The Fourth Industrial Revolution is a logical continuation of the Third Industrial Revolution, in which a synergetic basis is the driving force of socio-economic systems development. The term "Industry 4.0" is a buzzword used widely in German speaking countries for the Fourth Industrial Revolution currently taking place. Other terms frequently used in this context are cyber-physical systems, internet of things (IoT), smart factory, smart product, big data, cloud, machine to machine (M2M) (Lang, 2016).

The Fourth Industrial Revolution concept has received great significant after the speech at the International Environment Forum in Davos (January 2016) of one of the main theorists of "Industry 4.0" phenomenon Swiss economist Klaus Schwab. He described this phenomenon as the blurring between physical, digital and biologic areas (Schwab, 2016).

For the first time the concept of the Fourth Industrial Revolution has been formulated at the Hanover Fair in 2011. The phenomenon was defined as the introduction of cyber-physical systems in production processes. Currently it is Germany that is taking the leadership in the Fourth Industrial Revolution. A public-private program 'Industry 4.0' has developed. Large German corporations having research grant support from the Federal Government are to create a fully automated production lines (smart factories), in which products interact with each other and consumers within the concept Internet of things (Khel, 2016).

New methods of teaching-learning process will allow students going deeper into the current EU issues among which social and solidarity economy and social enterprises. Social economy and social enterprises have become really very important nowadays, it is because ‘they have proven to be able to engage in many and varied general interest fields of activity and tackle a variety of needs that arise in society. GECES considers it essential to highlight five positive contributions, each showing a dimension of the potential of the social economy and social enterprises to contribute to the development of the European Union’ (Social, 2016).

Table 1. A comparison between the Neoliberal Economy and the Solidarity Economy (IDEX, 2017)

Indicators	Neoliberal Economy	Solidarity Economy
1. The role of labor	a) Produce goods for sale b) Provide services	a) Satisfy needs b) Realize your potential
2. Organization of labor	Hierarchical owners are bosses	a) Democratic b) Support for the group c) Group decision-making d) As culture
3. Technology	Substitution of human labor	An instrument for labor
4. Land	a) Merchandise b) Individual property c) Business	a) Sustenance b) Collective property or individual property under collective use.
5. Production	For the market	a) For yourself/your family b) To exchange c) For the market
6. Product pricing	Depends on supply and demand	Depends on the work and its relationship to other products
7. The market.	Controlled by global big business and banks	Controlled by producers and consumers, according to their real needs
8. Money	Commodity, power	A means of exchange
9. Relationships	Transactional interactions	Ongoing cooperation and building power
10. Space	Competition	Free

Source: IDEX, 2017

As the example for student round table debates we may choose “The 2017 Commission Work Programme”. It confirms the full commitment to ensure the timely implementation of the Circular Economy Action Plan. The discussion may be around the European Commission Plastic Strategy 2017 to improve the economics, quality and uptake of plastic recycling and reuse, to reduce plastic leakage in the environment and to decouple plastics production from fossil fuels. These and many other actions will make it possible to transform socio-economic systems to sustainable development through green economy application. Greening the economy has to provide reduction of human footprint. Providing elements for forming green economy are:

- sustainable style of life with the priority of information goods consumption;
- diversification of green energy sources (solar, wind, geothermal, biogas, hydro);
- deconcentration of energy sources (hundreds millions power units instead of hundreds ones) integrated in one EnerNet;
- forming unified solidary economy on the European space.

Analyzing the above prerequisites for the achievement of sustainable development, it is possible to formulate the necessary qualities of the sessional economy, which simultaneously point to the directions on which the siding of the economy should move forward. The main ones are: resource renewability (renewable resources must become the fundamental basis of sustainable economy); dematerialization (drastic reduction in material intensity, energy intensity and environmental intensity); transformation (constant progress towards improvement through progressive transformations); innovation (perceptibility of rapid introduction of progressive innovations); naturalization (approximation of materials used, types of energy and technological processes to those that exist in nature); social orientation (the dominant goal is the transition from the priority of economic goals to the priority of social development goals); information orientation (informatization of production and consumption); ethics and humanization of economy (implementation of ethical principles of sustainable justice); synergy (the integration of individual economic entities into holistic systems (‘systems of systems’), many of which acquire the scope of regional, continental or global networks); decentralization (the increased freedoms of certain economic entities in making decisions and implementing activities according to the principle: ‘the center is everywhere, periphery is nowhere’); self-organization (increase the degree of systems self-organization according to the principle: ‘think globally – act locally’).

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